

CLAIMS

1. A method for simulating the impact of a projectile with a bone,
comprising:

- 5 determining the dynamics of said projectile and said bone;
calculating the contact forces of said projectile and said bone; and
calculating the fragmentation of said bone.

10 2. The method of claim 1, wherein the step of determining the dynamics is
comprised of the steps of:

- triangulating the geometry of said projectile with respect to said bone; and
describing the properties of said projectile and said bone.

15 3. The method of claim 2, wherein the step of calculating the contact forces
further comprises the use of nonsmooth contact analysis.

4. The method of claim 3, wherein the step of calculating the contact forces
further comprises the use of Newmark's explicit time stepping algorithm is to calculate
contact forces in discrete time steps.

20 5. The method of claim 4, wherein the implementation of Newmark's
explicit time stepping algorithm is comprised of the steps of:
predicting an unconstrained configuration that identifies violated constraints; and

returning the closest-point-projection of the predictor configuration onto an admissible set.

6. The method of claim 5, wherein the implementation of Newmark's
5 explicit time stepping algorithm further comprises the adoption of a penalty parameter in the predicting step.

7. The method of claim 6, wherein the step of calculating the fragmentation
of said bone further comprises:

10 applying an irreversible cohesive law to said bone;

applying an irreversible cohesive law to cracks in said bone as said cracks develop; and

applying an irreversible cohesive law to bone fragments as said fragments develop.